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Renesas Technology Corp.
Customer Support Dept.
April 1, 2003

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Keep safety first in your circuit designs!

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Remember to give due consideration to safety when making your circuit designs, with appropriate measures such as (i) placement of substitutive, auxiliary circuits, (ii) use of nonflammable material or (iii) prevention against any malfunction or mishap.

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HD151245

Octal Bus Transceivers With 3 State Outputs



ADE-205-597 (Z)
1st. Edition
Dec. 2000

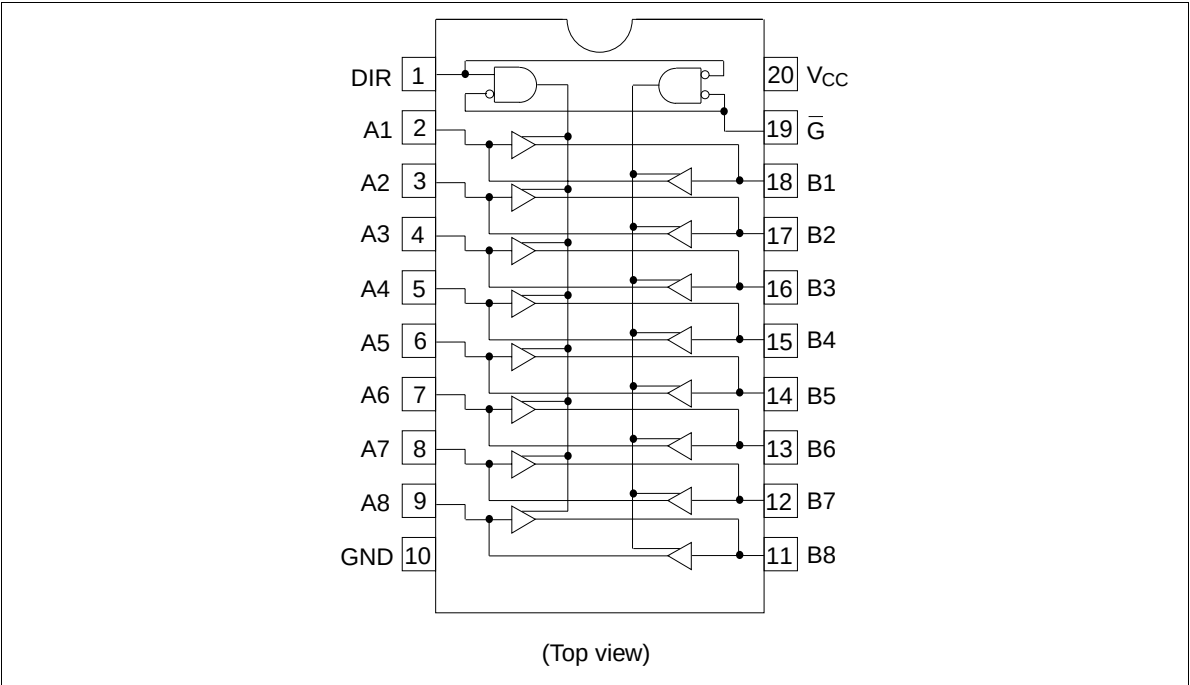
Description

The HD151245 features high speed operation and high drivability equivalent to the HD74LS245, which realize ultra low power dissipation. This device consists of eight bus transceivers with three state outputs in a 20 pin package. The device transmit data from the A bus to the B bus when the direction control (DIR) input is at the high level, and from the B bus to the A bus when the DIR input is at the low level, the enable input ($\overline{G}$) can be used to disable the device so that the buses are effectively isolated. The power up/down protection provides the outputs in high impedance state when V_{CC} is low regardless of enable input.

Features

- High speed: $t_{pd} = 10 \text{ ns typ.}$
- High output current: $I_{OH} = -15 \text{ mA}$
 $I_{OL} = 24 \text{ mA}$
- TTL Compatible Input/Output
- Wide operating temperature range: $T_a = -40 \text{ to } +85^\circ\text{C}$
- High impedance state for both
Input/Output in power off condition.
- Power Up/Down Protection

Pin Arrangement



Function Table

Inputs		Operation
$\overline{G}$	DIR	
L	L	B data to A bus
L	H	A data to B bus
H	X	Z

H : High level
L : Low level
X : Irrelevant
Z : High impedance

Absolute Maximum Ratings ($T_a = 25^{\circ}\text{C}$)

Item	Symbol	Rating	Unit
Supply Voltage	V_{CC}	-0.5 to +7.0	V
Input Voltage($\bar{G}$, DiR)	V_{IN}	-0.5 to +7.0	V
Input Voltage(A, B)	V_{IN}	-0.5 to +5.5	V
Output Voltage	V_{OUT}	-0.5 to +5.5	V
Power Dissipation	P_T	500	mW
Storage Temperature Range	Tstg	-65 to +150	$^{\circ}\text{C}$

Note: 1. The absolute maximum ratings are values which must not individually be exceeded, and furthermore, no two of which may be realized at the same time.

Recommended Operating Conditions

Item	Symbol	Min	Typ	Max	Unit
Supply Voltage	V_{CC}	4.5	5.0	5.5	V
Output Current	I_{OH}	—	—	-15	mA
	I_{OL}	—	—	24	mA
Operating Temperature	Topr	-40	25	85	$^{\circ}\text{C}$
Input Rise and Fall Time* ¹	t_r, t_f	0	—	250	ns/V

Note: 1. This item guarantees maximum limit when one input switches.

Waveform: Refer to test circuit of switching characteristics.

DC Electrical Characteristics (Ta = -40°C to +85°C)

Item	Symbol	V _{CC}	Min	Max	Unit	Conditions
Input Voltage	V _{IH}		2.0	—	V	
	V _{IL}		—	0.8		
Output Voltage	V _{OH}	4.5	2.4	—	V	I _{OH} = -3 mA, V _{IN} = V _{CC} - 2.1 V or 0.5 V
		4.5	2.0	—		I _{OH} = -15 mA, V _{IN} = V _{CC} - 2.1 V or 0.5 V
	V _{OL}	4.5	—	0.4	V	I _{OL} = 12 mA, V _{IN} = V _{CC} - 2.1 V or 0.5 V
		4.5	—	0.5		I _{OL} = 24 mA, V _{IN} = V _{CC} - 2.1 V or 0.5 V
Off State Output Current	I _{OZ}	5.5	—	±5.0	μA	V _{OUT} = V _{CC} or GND
	I _{OZ(off)}	0	—	±5.0		V _{OUT} = 5.5 V
Input Current	I _{IN}	5.5	—	±1.0	μA	V _{IN} = V _{CC} or GND
	I _{IN(off)}	0	—	±1.0		V _{IN} = 5.5 V
Output Short current* ¹	I _{OS}	5.5	-40	-225	mA	
Power Supply Current	I _{CC}	5.5	—	0.5	mA	I _{OUT} = 0 μA, V _{IN} = V _{CC} or 0.5 V
	I _{CCT} * ²	5.5	—	1.5		V _{IN} = V _{CC} - 2.1 V or 0.5 V

Notes: 1. Not more than one output should be shorted at a time and duration of the short circuit should not exceed one second.

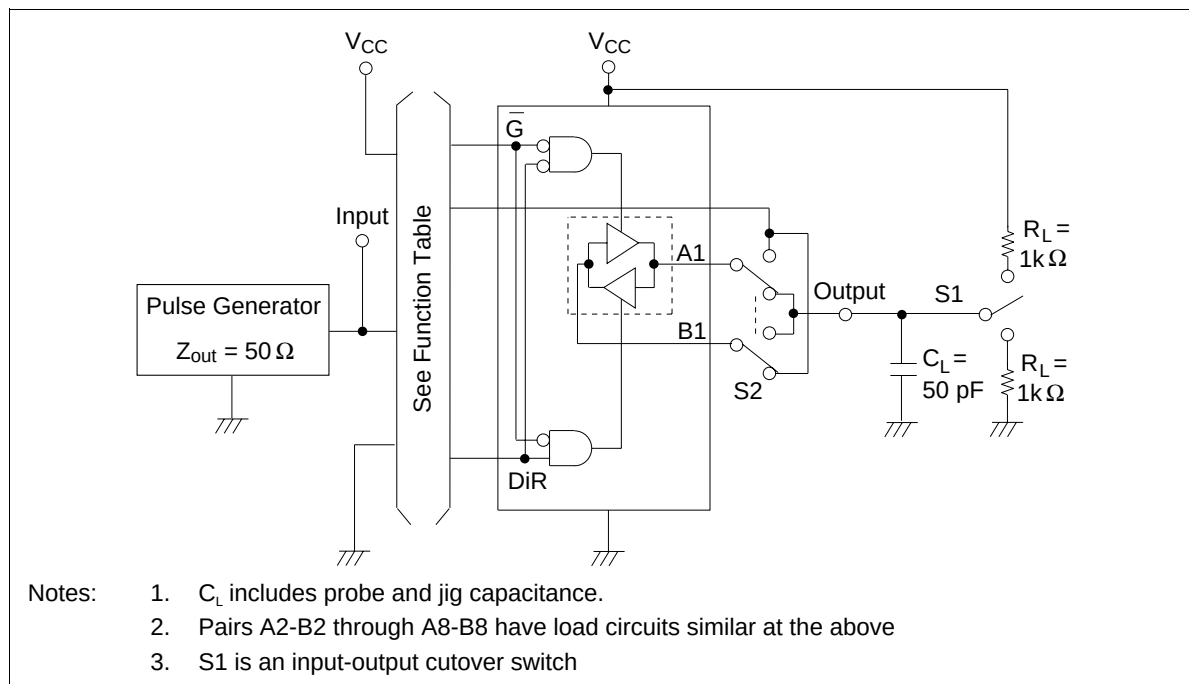
2. The values show the increase of I_{CC} perpin when TTL level input is applied.

Switching Characteristics (C_L = 50 pF)

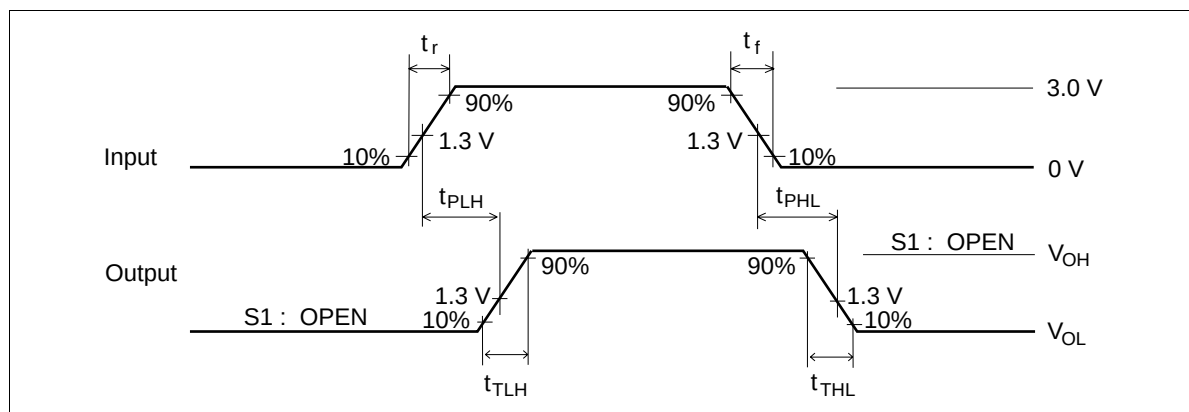
Item	Symbol	Ta = 25°C V _{CC} = 5 V		Ta = -40°C to 85°C V _{CC} = 5 V ± 10%		Unit	Conditions
		Min	Max	Min	Max		
Propagation Delay Time	t _{PLH}	3.0	15.0	3.0	18.0	ns	See Next Page
	t _{PHL}	3.0	15.0	3.0	18.0		
Transion Time	t _{TLH}	0.0	10.0	0.0	10.0	ns	See Next Page
	t _{THL}	0.0	10.0	0.0	10.0		
Output Enable Time	t _{ZH}	3.0	25.0	3.0	30.0	ns	See Next Page
	t _{ZL}	3.0	25.0	3.0	30.0		
Output Disable Time	t _{HZ}	3.0	25.0	3.0	30.0	ns	See Next Page
	t _{LZ}	3.0	25.0	3.0	30.0		
Input Capacitance	C _{IN}	—	5 (Typ)	—	—	pF	V _{IN} = V _{CC} or GND
Input/Output Capacitance	C _{I/O}	—	12 (Typ)	—	—	pF	V _O = V _{CC} or GND

Switching Time Test Method

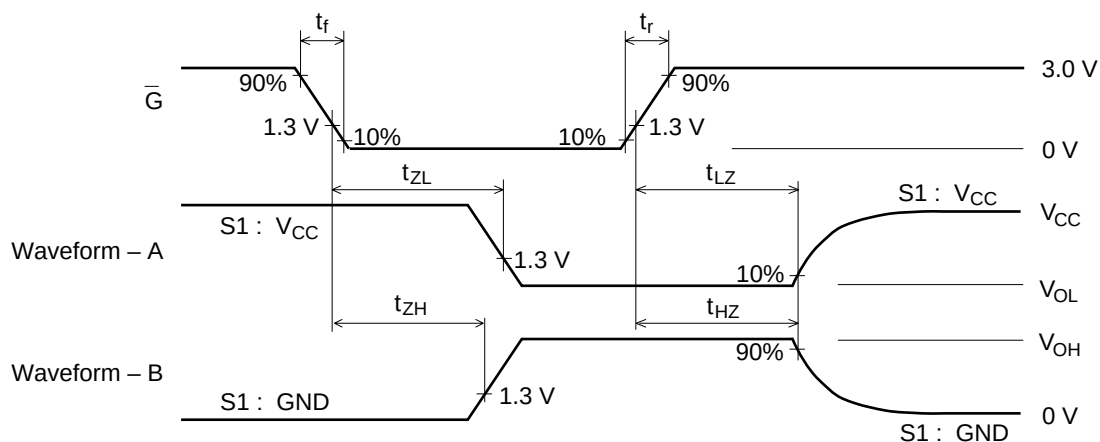
Test Circuit



Waveform-1



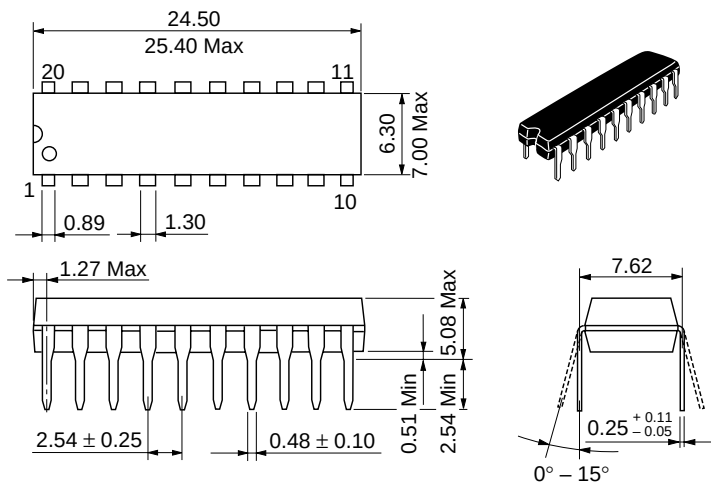
Waveform-2



- Notes:
1. $t_r = 6.0$ ns, $t_f = 6.0$ ns
 2. Input Waveform: PRR = 1 MHz, duty cycle 50%
 3. Inputs for waveform A should be set to apply outputs at low level when enabled by output control.
 4. Inputs for waveform B should be set to apply outputs at high level when enabled by output control.

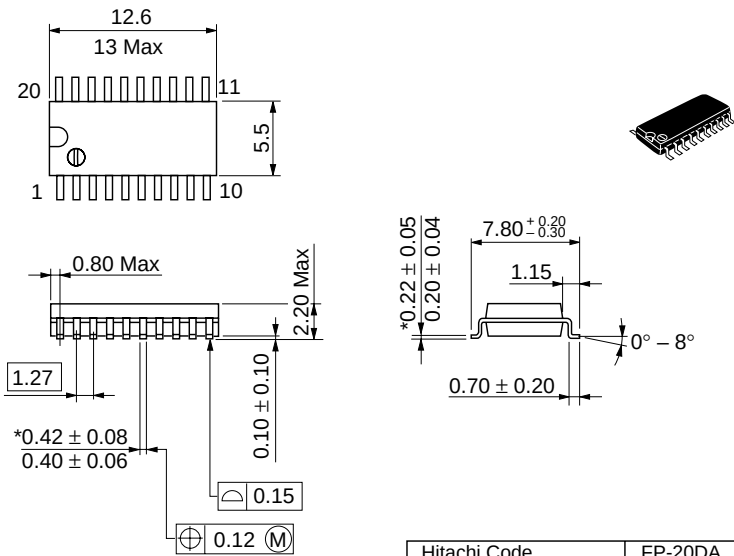
Package Dimensions

Unit: mm



Hitachi Code	DP-20N
JEDEC	—
EIAJ	Conforms
Mass (reference value)	1.26 g

Unit: mm



*Dimension including the plating thickness
Base material dimension

Hitachi Code	FP-20DA
JEDEC	—
EIAJ	Conforms
Mass (reference value)	0.31 g

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